OPTIMISE workshop:

'Spectroscopy as an indicator of biochemical processes in plants'

Location: Enschede (NL)
Dates: 26,29-30 September 2016.

Summary
Working groups 1 and 3 of the COST Action OPTIMISE met in Enschede on 26, 29 and 30 September to work on measurement protocols and on protocols for the retrieval of biophysical parameters from hyperspectral reflectance and fluorescence data. The objectives of the workshop were:

- To provide instructions and material for using the software packages SPECCHIO (hyperspectral data), SCOPE (modelling) and ARTMO (retrieval from spatial data).
- To develop protocols and terminology for hyperspectral remote sensing of vegetation:
  - Sampling
  - Retrieval algorithms
  - Quality flags
  - Scaling of measurements from leaf to satellite scale
- To formulate protocols to obtain biophysical products for field, airborne and satellite hyperspectral remote sensing data (reflectance, transmittance and fluorescence) of vegetation functioning
- To formulate of relevant research questions for short term scientific missions.

In total 41 people took part in the workshop: 23 from the OPTIMISE network, and 18 from outside. Twenty-six people took part in a training of SPECCHIO, SCOPE and ARTMO software on Monday, and 32 in the workshop on Thursday and Friday. Gender: F:M was 34%:66%.

Subgroup 1, consisting of *Petya Campbell, Dan Sporea, Luis Alonso, Tommaso Julitta, Yves Goulas, Maria-Pilar Cendrero*, focussed on measurements:
- Instrument characterization,
- Canopy measurement protocols
- Field measurement protocols.

Subgroup 2, consisting of *Betsy Middleton, Anatoly Gitelson, Nastassia Vilfan, Christiaan van der Tol, Shari van Wittenberghe, Jolien Verhelst, Vikas Pingle, Peiqi Yang, Sebastian Wieneke, Rumiana Vatseva, Megan Blatchford,* focussed on biophysical properties:
- Definitions (units and nomenclature) of relevant biophysical parameters
- Field sampling of biophysical parameters and photosynthesis
- Stepwise retrieval from spectra and other data to products

Subgroup 3, consisting of *Helge Aasen, Wout Verhoef, Zbynek Malenovski, Nick Hamm, Dimitri Dauwe, Monica Garcia, Lea Hallik, Andreas Hueni, Charles George, Daniel Kovac, Antonis Kavvadias, Giulia Tagiabue, Edward Morris, Paul Arellano, Leonidas Toulios (first day),* focussed on scaling issues:
- the identification of issues during upscaling from field to satellite level,
- the identification of important parameters for field campaigns using sensitivity analysis of models at leaf, canopy and satellite scale,
- the effects of vegetation heterogeneity on reflectance and fluorescence

The output of the workshop were reports on concepts and definitions. An example is shown below. The reports include: A list of existing algorithms with pros and cons, procedures for uncertainty estimation, quantification of computational efficiency, and an evaluation of the problems and opportunities of measuring in spatially heterogeneous areas. These are being worked out in research articles by the subgroups after the workshop.

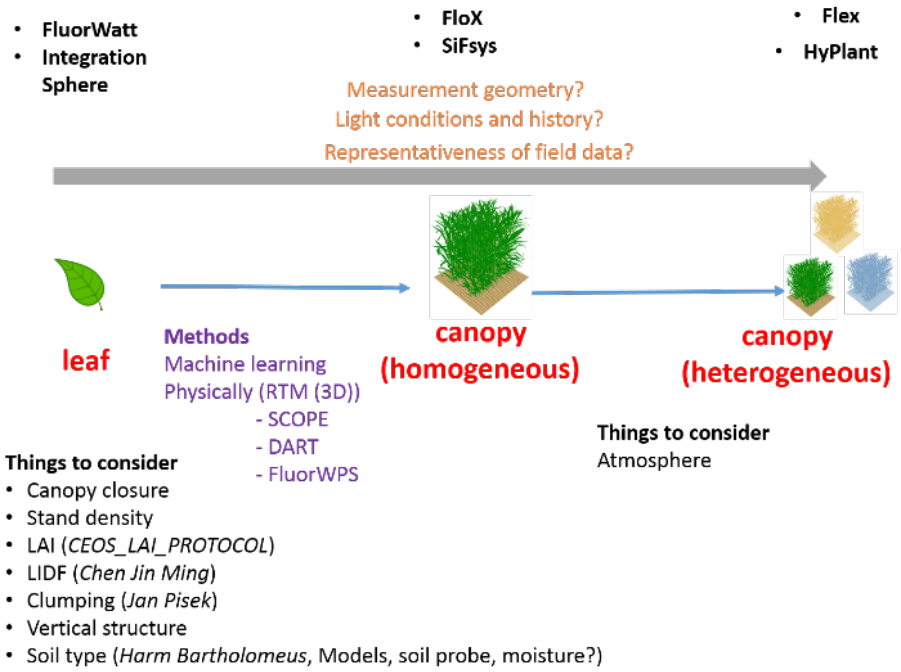

Figure 1. A summary slides of subgroup 3 on scaling issues



Training in the use of SPECCHIO, radiative transfer models (SAIL and SCOPE) and retrieval algorithms (ARTMO)



Breakout sessions in three groups to formulate measurement protocols, processing chains, and comparing measurements across spatial scales.






Opportunity to talk one-to-one to experts during breaks and lunches